

Claims

- [c1] 1. An apparatus in a drill string, comprising:
an internally upset drill pipe comprising a first end, a second end, and an elongate tube intermediate the first and second ends,
the elongate tube and the ends comprising a continuous inside surface with a plurality of inside diameters;
a conformable metal tube disposed the drill pipe intermediate the ends thereof terminating adjacent to ends of the drill pipe;
wherein the conformable metal tube substantially conforms to the continuous inside surface.
- [c2] 2. The apparatus of claim 1 wherein the metal tube is more corrosion resistant than drill pipe.
- [c3] 3. The apparatus of claim 1 wherein the metal tube has a rough outside surface.
- [c4] 4. The apparatus of claim 1 wherein the metal tube is expanded to conform to the drill pipe using hydraulic pressure.
- [c5] 5. The apparatus of claim 1 wherein the metal tube is expanded inside the drill pipe by being drawn over a man-

drel.

- [c6] 6.The apparatus of claim 1 wherein the apparatus comprises an insulating material between the metal tube and the inside surface.
- [c7] 7.The apparatus of claim 6 wherein the insulating material resists galvanic corrosion between the metal tube and the inside surface.
- [c8] 8.The apparatus of claim 1 wherein the metal tube is adapted to stretch with the drill pipe.
- [c9] 9.The apparatus of claim 1 wherein the metal of the metal tube is selected from the group consisting of steel, stainless steel, titanium, aluminum, copper, nickel, chrome, and molybdenum, or compounds, mixtures, and alloys thereof.
- [c10] 10.The apparatus of claim 1 wherein the metal tube comprises a non-uniform section expanded to conform to the inside surface of the drill pipe.
- [c11] 11.The apparatus of claim 10 wherein the metal tube has a regular end portion that is free of the non-uniform section.
- [c12] 12.The apparatus of claim 10 wherein the non-uniform section comprises protrusions selected from the group

consisting of convolutions, corrugations, flutes, and dimples.

[c13] 13.The apparatus of claim 10 wherein the non-uniform section extends generally longitudinally along the length of the elongate tube.

[c14] 14.The apparatus of claim 10 wherein the non-uniform section extends spirally along the surface of the tube.

[c15] 15.The apparatus of claim 10 wherein the non-uniform section is intermediate regular end portions of the metal tube.

[c16] 16.The apparatus of claim 10 wherein the non-uniform section is formed using hydraulic pressure.

[c17] 17.The apparatus of claim 10 wherein the non-uniform section is formed by roll forming or by stamping.

[c18] 18.The apparatus of claim 1 wherein one or more dies are used to form the non-uniform section of the tube.

[c19] 19.The apparatus of claim 1 wherein inside surface comprises a transition region forming a convex region and a concave region in the inside surface.

[c20] 20.The apparatus of claim 19 wherein the concave region comprises a resilient ring.